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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/575,268	04/11/2006	Volker Hennige	287417US0PCT	8870

22850 7590 12/08/2009  
OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, L.L.P.  
1940 DUKE STREET  
ALEXANDRIA, VA 22314

EXAMINER
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FORTUNA, ANA M

ART UNIT	PAPER NUMBER
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1797

NOTIFICATION DATE	DELIVERY MODE
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12/08/2009

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@oblon.com  
oblonpat@oblon.com  
jgardner@oblon.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/575,268	<b>Applicant(s)</b> HENNIGE ET AL.	
	<b>Examiner</b> ANA M. FORTUNA	<b>Art Unit</b> 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 24 August 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-26 and 28-34 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-26, 28-34 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                        | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 3-13, and 29, 33-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Canadian patent 2477062 (CA'062) (Equivalent to WO 03/073534), and alternatively in view of Guennouni et al (US 7,504,468). Patent CA'062 discloses the membrane of claim 1, comprising the support and at least one of aluminum oxide, zirconium oxide, titanium oxide and silicon oxide and mixtures thereof, using oxide particles within ranges claimed and the silicon alumina bonding is also disclosed in this reference (page 3, last paragraph bridging page 4; page 4, lines 10-29; page 6, last paragraph bridging page 7); the ceramic coating comprising the oxides (page 8, second paragraph, through page 9, line 17, column 10, second paragraph; page 12, lines 34-39).

3. The oxides particle size is disclosed (page 13, second paragraph); the later particle size selection is suggested for producing a membrane with suitable bendability (flexibility).

CA'062 discloses the claimed silicon bonding oxide by organic radicals (page 15, lines 29-36). The ceramic fractions, e .g 1-30 parts and 4-94 parts are not clearly disclosed in the CA'062 patent, however, the patent teaches making the coating with an

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oxide content of about 40 % of the composition (example 1 equivalent of to 125 g or the total components). The skilled in this art at the time this invention was made selecting more than one oxide for the coating can be motivated to add a mixture equivalent to the total amount of oxide suggested by the patent. Since the particle sizes and its effects in the final filter or membrane product are suggested in the patent, the skilled artisan at the time this invention was made would have been able to tailor the final membrane product based on the percentage or parts of each of the oxides or oxides fractions having a particular size, depending on the degree of flexibility and porosity desired, as suggested in this patent (page 13, lines 9-12).

The claimed silicon network, bonded via oxygen atoms to the oxides of the ceramic coating and bonded to via organic radicals to the polymeric nonwoven and via at least on carbon to the further silicon atom is not disclosed in such terms in the CA document ('062).

As in current specification and claim 1, CA'062 teaches using polymeric fibers as substrate, and use adhesion promoters admixed with the suspension (to be coated on the substrate); the adhesion promoters are disclosed as organofunctional silanes (page 13, lines 14 through page 14, line 29). The listed adhesive promoters include octylsilanes, fluorinated octylsilanes, vinylsilanes, amine-functionalized silanes (AMEO, DAMO), 3-methacryloyloxypropyltrimethoxysilane and/or glycidyl-functionalized silanes (GLYMO) (page 13, lines 19-30; page 14, lines 16-29).

It would have been obvious to one skilled in this art alternatively provide more than one of the adhesive promoters, as suggested by CA'062 in the adhesive

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composition to bond the oxide particles and the support material and provide a membrane difficult to detach from the support.

Current specification, page 13, second paragraph, teaches the formation of the claimed silicon network by using at least two adhesive promoters. And further states that "It is believed that the same effect can be achieved when at least one UV irradiation treatment is applied to a single UV -active adhesion promoter is added to the suspension.

Because CA'062 also teaches the application of adhesive promoter or mixtures including glycidyoxytrimethoxyoxysilane (GLYMO), or (MEMO), as discussed in pages 13-14 above, and further teaches heating the suspension on the substrate by irradiation (page 14, last line through page 16, line 27), the skilled artisan at the time this invention was made can predict that by using the same adhesive promoters or an adhesive promoter which is radiation sensitive, such as, MEMO, the reaction can produce the same type of bonding (to the support and oxide) as claimed in the current invention , because the treatment to achieve the particular silicon network is the same as in C A'062, or it would have been obvious to the skilled in this art at the time this invention was made, based on the suggested adhesive promoters and or its combinations and irradiation treatment.

Furthermore, CA'062 suggest the combination of aminofunctionalized silanes (AMEO, DAMO) and glycidyl-functionalized silanes (GLYMO) (page 13, lines 19-22);'which is one of the Applicant's preferred embodiments (see Applicant's specification, page 13, last paragraph). In applicant's process and CA'062, both

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promoters application is followed by irradiation, therefore, the skilled artisan can expect the same type of silicon network and linkages to the oxide and polymeric support.

Patent '468 is added as cumulative, this patent teaches an adhesive composition having a mixture of adhesive promoters, including GLYMO and MEMO, the composition can act as adhesive for polymeric and glass or other compositions (abstract, column 7, lines 25-65; column 12, lines 57 through column 13, line 4). The skilled artisan at the time this invention was made would have been motivated to use those particular adhesion promoters together, to enhance the bonding between of the silicon atom to organic groups, as suggested in '468 (column 7, lines 43-48).

As to claims 3, 4, preparing the particles fractions in via a sol are disclosed in the patent (page 16, second and third paragraphs, examples 1 and 2).

The thickness is further disclosed in this patent (see page 7, second paragraph).

As to claim 7, the substrate materials are disclosed (page 7, third paragraph).

As to claims 8, 10, 11, 12, CA'062 does not disclose the specific parts of each of the oxides in the mixture, however, the skilled artisan would have been motivated to vary the amount of a particular oxide or particle size of the oxide to optimize the resulting membrane, e.g. adhesion, flexibility.

Regarding to claims 6 and 9, the particles surface area, when the fraction selected is alumina, is inherent in the particles used in Ca'062, both the present invention and CA'062 use similar particles, e.g. MZS-1, MZS-3 ('062, page 22, lines 18-22); (see current specification, page 17).

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As to claim 13, the bendability in CA'062 is disclosed as down to a radius of 10-2 mm (page 8, last paragraph).

As to claims 29-30, the use as separators or electrodes, or electrodes devices and batteries is disclosed in this patent (abstract).

Claims 32-34 are covered by the discussion of mixing adhesive promoters above.

Expected beneficial results are evidence of obviousness of a claimed invention, just as unexpected results are evidence of unobviousness. In re Skroner, 186 USPQ 80 (CCPA 1975).

CA'062 does not show in examples the combination of adhesive promoters; however, 'a disclosure in a reference is not limited to its specific illustrative examples, but must be considered as a whole to ascertain what would be realistically suggested thereby to one of ordinary skill in the art. In re Uhlig, 54 CCPA 1200, 376 F2d 320; 153 USPQ 460.

4. Claims 1, 3, 4, 5, 8, 9, 10, 11, 12, 13 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davidson et al (US 5,605,628). Davidson et al discloses a composite inorganic membrane with a flexible nonwoven support and a porous film of non-metallic particles (abstract); the particles are selected from titania, alumina, zirconia and mixtures thereof (column 2, lines 38-56). Using particles fraction of particles size within the ranges claimed in present invention are suggested in this patent (column 2, last paragraph, bridging column 3). The coating application on the support in the form of a sol formed in presence of organic (polymeric solution), by known means, is disclosed in patent' 628. The later patent also teaches that the smaller particles act as to improve

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adhesion between the support and the film (column 2, last paragraph, bridging column 3). Davidson fails to disclose polymeric non-woven and bonding of the silicon of the network via organic radicals to the non-oven.

As discussed in the paragraph above, patent CA'062 teaches the use of flexible supports that can be made of polymeric and the bonding of silicon to the support is disclosed in the patent, e.g. by condensation of SiOR groups (page 15, last paragraph). The formation of these groups would have been predictable by the skilled artisan when using the support of CA'062, which supports are suggested for formation of the membranes made by the same oxides, as discussed above.

Patent '628 further support the mixing of particles of different particle size for adhesion between the coating and the support. The skilled artisan at the time this invention was made would have been motivated to use the combination of parts of particles of oxides and further add the particles of smaller size to promote adhesion on the nonwoven support, as suggested in patent '628. The application of the coating in the form of a sol is also disclosed in '268. Davidson ('268) adds to patent CA'062 the concept of mixing the particles of different sizes not only to promote flexibility but adhesion between the support and the coating of sol containing the smaller particles. Additional limitations of dependent claims are addressed in the paragraph above, patent CA'062.

### ***Double Patenting***

5. Claims 1, 3-13, 29, 30 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-12 of copending Application No. 10/524,143 in view of CA 2 477 062(CA '062) (discussed



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above). Combinations of the claims in the copending application are directed to coating the same support (non woven); polymeric, made from the same polymeric materials with coating of the same oxides and with particles of the same size. Although the claims in the copending application are broad than the claims in the present, are directed to a separator, both the separator and the membrane elements are directed to the same structure applications. The claims in the copending application are not directed to the silicon linkage to the support as in present claims. That limitation is disclosed in CA'062, as discussed in the paragraph above. The use of particles of different sizes and percentages is disclosed in the CA'062 patent. The mixing of particles parts to make a total of the particles in the sol, combining the different particles/sizes is not specifically disclosed, however, mixing small particles with larger size particles is suggested to improve product flexibility. It would have been obvious to one skilled in the art to tailor the final membrane properties, e.g. final degree of flexibility, bonding to the support and porosity, by controlling the amount of small particles in the particles mixture.

This is a provisional obviousness-type double patenting rejection.

6. Claims 1, 3-13, 29, 30 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-4, 6-8, 11, 12, of copending Application No. 10/524,669 in view of CA 2, 477 062. The copending application is directed to producing a separator with the same support material, flexibility and coating or the same oxide materials as in the present invention. The copending application lacks limitations directed to the oxide linkage to the support and the mixings

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of parts of oxides with different particles size, which later limitations are, disclosed in patent Ca'062, discussed in detail in the paragraphs above. The exact fractions of oxides of each corresponding particles size are not disclosed in '062, but they would have been obvious to the skilled artisan wishing to produce separator or membranes with different degrees of flexibilities; patent CA'062 suggests adding particles of smaller sizes to improve membrane flexibility, therefore varying the parts or percentages of particles of smaller sizes, and the portions of the particular oxides present in the mixture, the skilled in the art applying the same technology would have been able to produce different products with predictable properties.

This is a provisional obviousness-type double patenting rejection.

### ***Response to Arguments***

Applicant's arguments with respect to claim 8/24/09, and 7/7/09 have been considered but are moot in view of the new ground(s) of rejection. The current rejection is based on the same primary reference CA'062, and is expanded to respond to Applicant's concern about the reaction of the adhesive promoters. Patent 7,504, 468 is further added to the rejection, which suggests using a mixture of adhesive promoters in an adhesive composition, including MEMO and GLYMO, and having the RX-Si (OR) groups.

Applicants argue that the references of record do not disclose combination of GLYMO and AMEO. Applicant is invited to review section (page 13, lines 19-22; and page 14, lines 16 to 29), based on that section of the CA'062, combinations of any

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aminefunctionalized silane (AMEO, DAMO) and glycidylfunctionalized silanes (GLYMO) can be used in a mixture.

As discussed in the rejection above, application of irradiation is applied in both this current invention and the CA'062 document, Therefore the same final linkages are obtained.

Applicants also argue that the CA document does not disclose the second oxide fraction. Using a second oxide fraction as adhesion promoter which can be fixed with the further adhesion promoters is discussed in the CA document (page 14, lines 14-30).

Because the membrane is the present invention is made from the same oxide composition and support material and use the same adhesives suggested in CA'062, and same further treatment (irradiation) to react the same combination of adhesives (as discussed above), the same bonding or reaction is expected by the skilled artisan.

Additional rejections are maintained based on the teaching of the CA'062 reference, ad discussed in paragraph 2, above.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Additional references are cited but are no prior art.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Amendment filed on 7/7/09, are entered in the record.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANA M. FORTUNA whose telephone number is (571)272-1141. The examiner can normally be reached on 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vickie Kim can be reached on 571-272-0579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ANA M FORTUNA/

Primary Examiner, Art Unit 1797